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(12) # EUROPEAN PATENT APPLICATION

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(71) Applicant: RAYCHEM PONTOISE S.A.
2-4 Avenue de l'Eguillette Z.A. du Vert Galant
F-95310 Saint-Ouen l'Aumone (FR)

(72) Inventor: Clements, Victor
Grosvenor House 38 Westlecot road
Swindon Wiltshire (GB)

(74) Representative: Dlugosz, A.C. et al
Raychem Limited Intellectual Property Law Department
Faraday Road Dorcan
Swindon Wiltshire (GB)

(54) **Data transmission bus coupler.**

(57) A plug-in coupler for forming a splice between a data transmission bus of a multiplexed data transmission system and a plurality of stubs of the system comprises a generally flat housing having a pair of disconnectable connector portions 5 that are connected to each other within the housing by a pair of conductors 7 so that an in-line splice can be formed in the data bus. The housing also has an array of contacts 6 for forming releasable connections to a number of stubs, the contacts being transformer coupled to the conductors 7 via isolation transformers 8 and resistors 9.

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Description

DATA TRANSMISSION BUS COUPLER

This invention relates to the transmission of data, and especially multiplexed serial data transmission.

Such systems are increasingly becoming important for a number of applications, for example in military avionics, where data is sent to equipment in the aircraft via a single data transmission bus, or data bus, that is common to a number of items of equipment, and a branched line or stub that connects the equipment to the data bus.

According to the present invention, there is provided a plug-in coupler for forming a splice between a data transmission bus of a multiplexed data transmission system and a plurality of stubs, which comprises a generally flat housing having a pair of disconnectable connector portions that are connected to each other within the housing by a pair of conductors so that an in-line splice can be formed in the data bus, and an array of contacts for forming releasable connections to a plurality of stubs, the contacts being transformer coupled to the pair of conductors.

Each of the stubs is coupled to the data bus within the housing by a transformer coupling arrangement which usually comprises an isolation transformer and a resistance of about 50 ohms on each line between the isolation transformer and the data bus so that a short circuit in one of the stubs, for example caused by damage to the equipment, will not affect the remainder of the data transmission system.

The coupler according to the invention has the advantage that it is particularly compact compared with known systems that use a coupler for individual stubs. In addition the coupler is particularly versatile in that it can easily be removed and changed to accommodate alteration in the equipment that is controlled by the system, and can be removed for testing or replacement. The coupler may be made, for example, in the form of a conventional plug-in rectangular connector having a coupler extension mounted on an end thereof. The connector may then be mated with a corresponding rectangular connector e.g. on opposite sides of a bulkhead in a conventional manner. The fact that the coupler can be made in such a small size has the additional advantage that there is a greater choice of location of the coupler in the aircraft. For example, one problem with conventional databus systems is that, although the main databus can be balanced e.g. by appropriate impedance connections at each end, the connection of stub lines to the databus disturbs the balance, and this disturbance is worsened as the stub length is increased. By using databus couplers according to the invention it is possible for the main databus to extend in a relatively convoluted path so that it passes near (e.g. less than about 6m and preferably less than 3m) to the equipment with a consequent reduction in stub length. For example in military aircraft it is possible to pass the databus along the aircraft wings and provide a coupler in the region of the missiles or other equipment rather than to provide a long stub from a coupler in the centre of the aircraft fuselage.

In one form of coupler according to the invention the disconnectable connector portions and the contacts for forming connections to the stubs are arranged together as a single array in a connecting face of the housing so that the stubs and the data bus may be disconnected in a single operation. This form of coupler is appropriate for use where the data bus is provided for example in the equipment racking system or where a connection can be made to the data bus via the racking system. In an alternative form of coupler the contacts for forming connections to the stubs are arranged together as a single array in a connecting face of the housing and the disconnectable connector portions for the data bus are located at separate points on the housing spaced apart from the connecting face of the housing. This form of coupler is appropriate where, for example equipment or racking for the equipment is to be installed and the data bus extends outside the equipment or racking. The connector portions for the data bus are preferably arranged on opposite sides of the housing substantially in line with each other, in order to simplify the path of the data bus.

If, as is often the case, it is desired to screen the cables and the interior of the coupler from electromagnetic interference, this may easily be achieved, for example by the arrangement described in our copending European patent application No. 88305402.5.

The coupler will normally contain connection contacts for at least 4 stubs, preferably at least 6 stubs but normally not more than 12 stubs and especially not more than 8 stubs.

Two connectors in accordance with the invention will now be described by way of example for reference to the accompanying drawings, in which:

Figure 1 is an isometric view of one form of coupler according the the invention;

Figure 2 is a schematic circuit diagram of the coupler of figure 1;

Figure 3 is an exploded view of the coupler of figure 1 showing the electrical components;

Figure 4 is a perspective view of another form of coupler according to the invention; and

Figure 5 is a circuit diagram of the connector of figure 4.

Referring initially to figures 1 to 3 of the accompanying drawings, a coupler 1 for forming a splice between a data bus of a multiplexed serial data transmission system comprises a generally flat die cast aluminium housing 2 that is formed in three parts, a top and bottom shell half 2 and 3, and a connector part 4 which encloses an array (not shown) of male or female contact elements for forming a push fit electrical connection.

The coupler contains an array of eight coaxial male or female contacts 5 and 6 each comprising a pair of contact elements arranged coaxially, the two contacts 5 being connected together within the housing

ly conductors 7 so that the contacts 5 can be connected to the main data bus in order to form an in-line splice in the data bus when the coupler is pushed into the socket. The six contacts 6 are each connected to the conductors 7 via isolation transformers 8 and 52 ohm resistors 9 mounted on a printed circuit board 10.

The connector part is provided with side lugs 11 containing screw-threaded bolts 12 for firmly fixing the connector part 4 of the coupler to a bulkhead, racking tray or the like that contains a mating comector socket.

An alternative form of coupler is shown in figures 4 and 5. This form of coupler has a flat housing comprising top and bottom shell halves 2 and 3 and connector part 4 which encloses an array (not shown) of male or female contact elements for forming a push-fit electrical connection.

The housing has two disconnectable connector portions 13 and 14 that are connected to each other within the housing by conductors 7 so that an in-line splice can be formed in a data bus that extends outside the bulkhead, equipment or equipment racking system. In addition, the coupler has an array of eight coaxial male or female contacts 6 that are connected to the conductors 7 via isolation transformers 8 and resistors 9 which are mounted on a printed circuit board (not shown) in the same manner as in figure 3.

As with the coupler shown in figure 1, side lugs 11 containing screw-threaded bolts 12 are provided for fixing the connector part 4 to a bulkhead or racking tray.

Claims

1. A plug-in coupler for forming a splice between a data transmission bus of a multiplexed data transmission system and a plurality of stubs, which comprises a generally flat housing having a pair of disconnectable connector portions that are connected to each other within the housing by a pair of conductors so that an in-line splice can be formed in the data bus, and an array of contacts for forming releasable connections to a plurality of stubs, the contacts being transformer coupled to the pair of conductors.

2. A coupler as claimed in claim 1, wherein the disconnectable connector portions and the contacts for forming connections to the stubs are arranged together as a single array in a connecting face of the housing.

3. A coupler as claimed in claim 1, wherein the contacts for forming the connections to the stubs are arranged as a single array in a connecting face of the housing and the disconnectable connector portions are located at separate points on the housing spaced apart from the connecting face of the housing.

4. A coupler as claimed in claim 3, wherein the connector portions are arranged on opposite sides of the housing substantially in line with each other.

5. A coupler as claimed in any one of claims 1 to 4, which contains connection contacts for at least 4 stubs.

6. A coupler as claimed in any one of claims 1 to 5, which contains connection contacts for up to 12 stubs.

7. A coupler as claimed in claim 5 or claim 6, which contains connection contacts for from 6 to 10 stubs.

Fig.1.

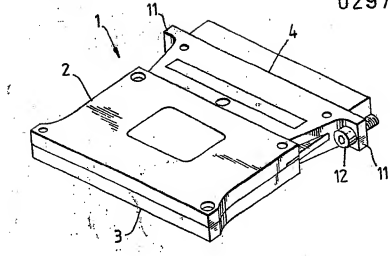
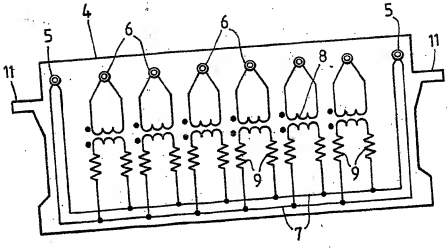


Fig.2.



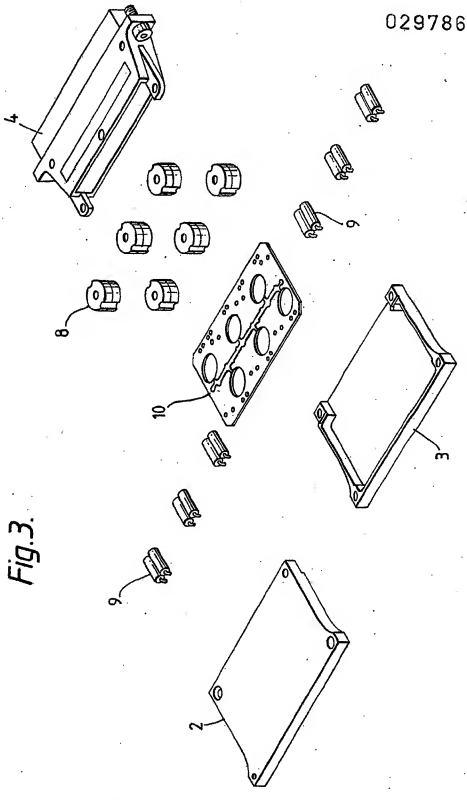


Fig.3.

Fig.4.

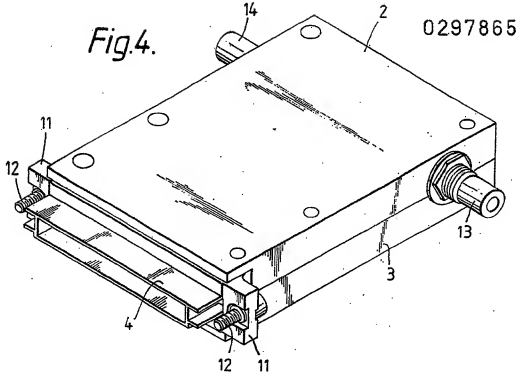
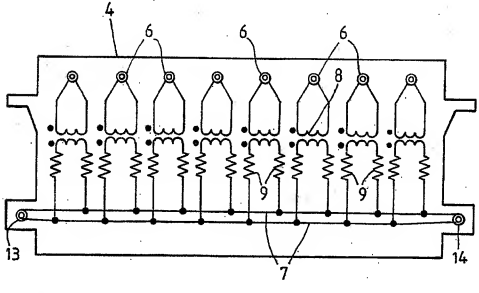


Fig.5.



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(71) Applicant: **RAYCHEM PONTOISE S.A.**
2-4 Avenue de l'Eguillette Z.A. du Vert Galant
F-95310 Saint-Ouen l'Aumone(FR)

(72) Inventor: **Clements, Victor**
Grosvenor House 38 Westlecot road
Swindon Wiltshire(GB)

(74) Representative: **Dlugosz, A.C. et al**
Raychem Limited Intellectual Property Law
Department Faraday Road Dorcan
Swindon Wiltshire(GB)

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EUROPEAN SEARCH REPORT

Application Number

EP 88 30 5940

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	DE-A-3 513 482 (R. HIRSCHMANN RADIOTECHNISCHES WERK) * page 7, lines 15-26; figure 2 *	1	H 01 R 13/66 H 03 H 7/48 H 01 R 23/66
A	GB-A-1 067 952 (H. KOLBE et al.) * claims *	1	
A	WO-A-8 604 195 (NCR CORP.) * abstract; figure 1 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

H 01 R 13/00
H 01 R 23/00
H 01 R 25/00
H 03 H 7/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	28-12-1989	CLOSA D.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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